was the grave of a medicine man who had flourished more than 200 years before, six successors having filled his office, each one living to a good old age. Careful questioning failed to evoke any other answer. When the coins were shown to the Chilcats, they could not remember having ever seen such objects. Lieut. Bolles concludes that the coins probably were derived from a junk driven on the coast about two centuries ago. "To those," he says, "who doubt the advent of junks on the west coast at this early date, these facts will probably not be satisfactory, but it will be necessary for them to break down by direct evidence such a strong plea."

MESSRS. H. ALABASTER, GATEHOUSE & CO. have now in the press, shortly to be issued, a new work, entitled, "Domestic Electric Lighting, treated from the Consumer's Standpoint." The author is Mr. Ed. C. de Segundo.

"THE ELECTRICIAN" Printing and Publishing Co., Limited, have in preparation for their "Electrician" Series the following volumes:—"Electromagnetic Theory," by Oliver Heaviside; "Electrical Engineering Formulæ, &c.", by W. Geipel and H. Kilgour; "Submarine Cable Laying and Repairing," by H. D. Wilkinson; "Drum Armature Winding and Commutators: in Theory and Practice," by F. M. Weymouth; and "Electricity as a Motive Power," by Albion T. Snell, M.I.C.E., M.E.

THE first series of lectures given by the Sunday Lecture Society begins on Sunday afternoon, October 23, in St. George's Hall, Langham Place, at 4 p.m., when Dr. Andrew Wilson will lecture on "The Distribution of Animals and what it teaches." Lectures will subsequently be given by Mr. Willmott Dixon; Prince Kropotkin; Mr. R. Brundenell Carter; Mr. Arthur W. Clayden; Prof. H. Marshall Ward, F.R.S.; and Dr. E. E. Klein, F.R.S.

ANOTHER memoir upon persulphuric acid and the persulphates is contributed by M. Berthelot to the *Annales de Chimie et de Physique*. As described in our note of vol. xliv., p. 577, the potassium, ammonium, and barium salts of this interesting acid were obtained last year by Dr. Marshall, of Edinburgh, in tolerably large quantity and in well-developed crystals. M. Berthelot, to whom the honour of the first preparation of persulphuric acid and its anhydride is due, now publishes his further work upon the subject, fully confirming Dr. Marshall's results, and adding a few more facts to our knowledge of the acid and its salts. The form of electrolysis apparatus which has been found by M. Berthelot to yield the best results consists of a double cell, the inner vessel of which is constructed of porous porcelain. The liquid contents of both the interior and exterior vessels are cooled by means of glass worms through which a constant current of cold water is maintained. The inner cell of 150 c.c. capacity contains a concentrated solution of potassium or ammonium sulphate, according as potassium or ammonium persulphate is required, in sulphuric acid diluted with six or seven times its volume of water. The nearer the composition of this liquid approaches to that of a solution of bisulphate of potassium or ammonium, the greater is the yield of persulphate. The exterior cell is simply filled with dilute sulphuric acid. The positive pole in the interior cell is most advantageously formed by a stout platinum wire, about one millimetre in diameter, as persulphuric acid is found by M. Berthelot to be rapidly decomposed in contact with a large surface of platinum. Platinum sponge, indeed, instantly decomposes the acid or solutions of its salts. The negative pole in the outer cell may conveniently take the form of a large plate of platinum. The current employed was one of three amperes derived from accumulators. At the expiration of fifteen to twenty hours the internal cell is found to contain large quantities of beautiful crystals of the persulphate. The usual yield of the potassium salt was 20-25 grams, and of the more soluble ammonium salt as much as 40-45 grams, in one operation. M. Berthelot has also obtained potassium persulphate by the direct electrolysis of sulphuric acid and subsequent addition to the product of a concentrated solution of potassium bisulphate, crystals of potassium persulphate, KSO_4, being at once deposited. This mode of preparation is not so advantageous as the method of production by the electrolysis of potassium sulphate as above, but affords interesting proof of the formation of free persulphuric acid by the electrolysis of oil of vitriol. M. Berthelot has further succeeded in preparing persulphuric acid by the gradual addition of anhydrous barium peroxide to concentrated sulphuric acid in a small flask surrounded by ice. So rapid is the action that if the addition of the peroxide is continued until the sulphuric acid is almost exhausted, even although the vessel is maintained in pounded ice, dense vapours are evolved which possess the remarkable odour and other properties of persulphuric anhydride. Another interesting fact observed by M. Berthelot is that a solution of potassium persulphate attacks mercury, even at the ordinary temperature, with production of a yellow basic sulphate which appears to be identical with the salt known since the times of the alchemists as *turpith mineral*.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Miss E. A. Hill; two Racoons (*Procyon lotor*) from North America, presented by Captain Sharp; a grey Ichneumon (*Herpestes griseus*) from India, presented by Mrs. Wyndham Bewes; a Stanleyan Chevrotain (*Tragulus stanleyanus*) from Java, presented by Mr. Chas. J. Noble; a Vulpine Phalanger (*Phalangista vulpina*, ♂) from Australia, presented by Master H. H. Barret; a White Stork (*Ciconia alba*), European, presented by Sir H. Rae-Reid, Bart., F.Z.S.; an Ostrich (*Struthio camelus*, ♂) from Africa, presented by H.M. the Queen; a Common Chameleon (*Chamæleon vulgaris*) from North Africa, presented by Mrs. Davidson; three Negro Tamarins (*Midas ursulus*) from Guiana; a Canarian Laurel Pigeon (*Columba laurivora*, ♂) from the island of Gomera, Canary Islands; two Nicobar Pigeons (*Colænas nicobarica*) from the Indian Archipelago, deposited; an Indian Muntjac (*Cervulus muntjac*, ♀) from India; four Ringed Plovers (*Ægialitis hiaticula*) and two Dunlins (*Tringa alpina*), British, purchased.

OUR ASTRONOMICAL COLUMN.

LUMINOUS NIGHT CLOUDS.—In an article communicated to *Astronomische Nachrichten*, No. 3120, Herren W. Foerster and O. Jesse invite astronomers and geophysicists both here and abroad to make observations of the very interesting phenomena of luminous night clouds, the appearance of which has, up till now, been observed more or less only at Berlin. Since the year 1885, the authors tell us, these appearances have been most noticeable, and it is because they are now becoming less so that they wish to have as many observations made as possible. The phenomenon appears in the form of cirrus clouds, which stand out bright against the twilight sky. The colour generally noticed is that of a bluish white, and when the horizon is approached, gold and red tints are added. The best time for observation is said to be just before and after sunrise and sunset. From photographs taken at Berlin, it has been computed that these clouds are at a height of 82 kilometres. Long after the sun has set they are seen to reflect the sunlight, but as soon as they fall within the reach of the earth's shadow they immediately become invisible. The observations show, so far as may be judged from those already at hand, that the movements of this phenomenon after midnight are directed from the north-east ± 40°, and the authors think it highly probable that the resistance of the medium surrounding the earth accounts for these movements. This is to a certain extent affirmed by observations made at Punta Arenas and other places, the phenomena occurring six months after the conclusion of the Berlin observations. The authors suggest that eye observations

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(taken every few minutes) should be made in different latitudes, to ascertain the apparent height to which these clouds attain. The determinations of azimuth and altitude should also be current to three or four minutes of arc, and the time to two or four minutes. Notice should also be taken of the general state of the atmosphere at the time of observation, while photography should be employed to record their place and motion. The paper contains one or two more suggestions, among which is the employment of the spectroscope, and concludes with the hope that the importance of this phenomenon in relation to cosmical problems will arouse much interest and enlist many observers, for, in such a case as this, the observations of one institution will not help to solve such a general question as this.

NOVA AURIGÆ.—From the communications, in *Astronomische Nachrichten*, No. 3120, we make the following notes with reference to the magnitude and spectroscopic appearance of the Nova Aurigæ.

Dr. J. Holetschek, of the Vienna Observatory, has examined the star with regard to the former, and finds that, if any, an increase in brightness has taken place since August 24. The following are his figures, N. standing for the Nova, and *a* a neighbouring star, the magnitude of which is taken as 9·7. The hours refer to Vienna mean time :—

1892.	h.	N.	m.
August 24	13¾	0·5*a*	9·65
,, 26	14	2*a*	9·5
,, 27	14	1·5*a*	9·55
,, 28	12¾	2·5*a*	9·45
,, 30	12¼	2*a*	9·5
Sept. 2	14	3*a*	9·4

Observations made on Sept. 15 12h., Sept. 16 11½h., and Sept. 17 12½h. showed that N. was at least four degrees brighter than *a*, and two degrees brighter than the star, 9·5m. B.D. + 30°·924.

Using the 30-inch of the Pulkova Observatory, Mr. A. Belopolsky has made some measurements of the brightest line visible in the spectrum. His measures are :—

1892.	W.L.	Mean.
September 10	501·2$\mu\mu$	
,, 12	501·1	
,, 14	(499·5)	501·0
,, 15	500·9	
,, 16	500·7	

Of the other lines there were seen D or D_3, F, and a dark line about wave-length 465$\mu\mu$.

MINOR PLANETS.—The application of photography to the search of minor planets seems to be rewarded with remarkable success, for no less than four new ones, 1892, E, F, G, and H, have, since September 25, been discovered. The first two are due to M. Perrotin, while the last two were photographed by M. Wolf. A fact worth recording is that the plate, on which the latter planets were found, contained also two other images, those of the planets (34) Circe, and (184) Dejopeja ; thus the positions of four planets were obtained with one exposure.

REPORT OF MR. TEBBUTT'S OBSERVATORY.—In this small pamphlet we have a condensed account of the present state of the observatory buildings, instrumental equipment, &c., together with the work done during the year 1891. Although the staff is not very great, yet the work carried out shows that all the available time has been made the most of. The observations include forty-six occultations of stars by the moon, phenomena of Jupiter's satellites, transit of Mercury, conjunction of Venus and Jupiter, and filar micrometer comparisons of the minor planet Ceres, comprising 106 comparisons and four comparison stars. Several comets were observed with the square bar-micrometer, while some interesting double stars and the two variables of Argus and R. Carinæ have also been worked at. The 9h. a.m. meteorological observations have been continued with the usual regularity.

PHOTOGRAPHIC CHART OF THE HEAVENS.—In a paper read on July 1, 1891, before the Royal Society of New South Wales, Mr. H. C. Russell relates many of his experiences, together with some of the results obtained during the preparation of the Sydney Observatory for the photographic chart of the heavens. The first difficulty that turned up had reference to the photographing of the stars of the fourteenth magnitude. The two minutes' exposure was found quite long enough for ninth magnitude stars, but the thirty minutes was not sufficient to record those of the fourteenth. A question also arose as to coloured stars, for in many cases stars visible telescopically were not photographed at all. Of the many objects photographed with the portrait camera, Mr. Russell describes very fully the beautiful nebula 30 Doradus. This nebula, as he says, is a great spiral structure, of which we see the greatest diameter, its thickness measured through in the line of sight being comparatively small. He has been able also to obtain a very fine photograph of N. Argus, a nebula, which, as may be concluded from the negative, "covers a much larger area than that of Orion." The same photograph also confirms the observations made by Mr. Russell in 1872 that a conspicuous part of the nebula which Herschel drew and described in 1838 has wholly disappeared, and that its place is now occupied by a dark round spot. What this may be is a doubtful question, but as Mr. Russell says "It cannot be a solid body, because the stars are there, but a slight misty body would hide the nebula and not affect the stars very much." The pamphlet concludes with an excellent picture of the κ Crucis cluster.

GEOGRAPHICAL NOTES.

COLONEL BAILEY, R.E., lecturer on Forestry in the University of Edinburgh, has been appointed secretary to the Royal Scottish Geographical Society, in room of Mr. A. Silva White, whose resignation on account of ill-health we noticed some months ago.

PROF. CHERSKI, whose projected journey in Eastern Siberia was mentioned in Geographical Notes for June 30 (p. 212) is reported to have died near Sredne Kolymsk, on his way down the Kolyma river towards Nizhne Kolymsk, where he intended to have passed the winter. Cherski has travelled frequently and far in Siberia, and has done much to elucidate the geographical conditions, and in particular the geology of many parts of Northern Asia. His great geological map of the Lake Baikal district is the work by which he will be best remembered.

THE current number of the *Scottish Geographical Magazine* contains Mrs. Bishop's account of her travels in Ladak and the adjacent territories, often called Lesser Tibet. As a record of personal adventure and observation of native character the paper ranks worthily with the published records of this traveller's earlier and later journeys.

THE *Proceedings* of the Royal Geographical Society for October publishes a short statement of the progress of Indian surveys during the last field season. In Bengal the Behar detachment completed the traverse survey of 1610 square miles in districts Muzaffarpur and Champaran. In Bombay 2536 square miles of detailed survey were completed on the scale of two inches to one mile, and 2100 square miles were triangulated in the Gujarat and Mahratta country. Two parties were at work in Burma. In district Sagaing 1842 square miles of cadastral survey and 1142 of traverse survey were completed, while 700 square miles of traverse survey were made in district Shwebo, and a topographical survey, on the scale of one mile to an inch, of 106 square miles of the Chindwin coalfields. There were also carried out in districts Amherst, Tavoy, and Mergin 881 square miles of cadastral survey, besides a traverse survey of 510 square miles.

THE MICRO-ORGANISMS OF THE SOIL.[1]

THE high office with which you have honoured me entails the delivery of an address, which I keenly feel I cannot give in keeping with the standard set by my distinguished predecessors.

Fermentation, though observed since pre-historic times, is perhaps less understood than any chemistry has to deal with. The exciters of fermentation are rendered exceedingly difficult of investigation, because they, like all living things, are subject to physiological—or more specially pathological—functions of life ; they are so sensitive that any abnormal influence either changes their whole mode of existence or destroys it altogether ; a medium suitable to the life of one special kind is changed by

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[1] Address delivered by Prof. Alfred Springer as Vice-President of Section C. at the meeting of the American Association for the Advancement of Science.

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